M&M Radioactive Decay



1. Click on the Half-life link and let it load while you start the activity.

<http://www.geogebra.org/en/upload/files/english/slburkey/HalfLife3.html>

1. Take a second to look at the applet. Notice the graph on the left and the Spreadsheet on the right. Column A represents each time you will dump and count your M&M’s. Column B represents how many M’s are left each time.
2. There is a blue icon at the top right corner of the graph. If you need to restart, click this button.
3. Each M&M is an atom.

**Procedures:**

1. Each group should have 80 M&Ms, a plastic cup, and a paper plate.
2. Shake the M&M’s out onto the paper plate and separate the ones showing the M and the ones not showing the M.
3. Count the number of M&Ms showing Ms. Record this number in Column B of the online applet next to point 2.
4. Put the M showing M&Ms back in the cup and repeat. Eat the ones without an M showing.
5. Continue shaking and counting Ms until there are no M&Ms left. Make sure to record it each time in Column B!! However, **DO NOT record a** **0** when you are done.
6. What does each of the following represent?
7. Each trial

Time

1. The M&Ms with Ms showing

How much is remaining

1. The M&Ms with Ms NOT showing

How much is gone

1. Highlight columns A and B and right-click. Click – **Create List of Points**
2. You should notice that points appear on your graph to the left. What do you notice about their shape?

It’s kind of curved

1. What does the graph represent?

The amount of M&Ms remaining as a function of time

1. A **line of best fit** is a line that best represents the data on a graph. Create a line of best fit by clicking this icon and then points on your graph. Does this line “fit” your data well? Explain.



We tried to get as many points above the line as below the line

1. Try using different points. What do you notice happening? Did this create a better line of best fit or not? Explain the difference.

No, we made it worse

1. Click, hold, and drag on the graph to select all of the points (with a light blue rectangle). What is different about this line of best fit? This is your “best” line of best fit! What do you think makes it the best?

The average space is about the same between each point and the line

1. Click the icon and then click somewhere near the top of your graph. Create an appropriate title for your graph and list your group members.



1. Take a screenshot of your graph, save it using your group name and a .jpg extension, then upload it to your group’s page on the class wiki.
2. Hide all of the other lines (all except the line you created in question 12). [Click on and click on all of the lines that you would like to hide, and then choose a different tool.]



1. At the bottom of the graph is an Input bar. Type **FitExp[list1]** and hit enter. Describe the new curve formed. Does this curve better fit the data versus the line you chose in question 12? **Why?**

Yes, because it’s curved like the pattern that the points follow

1. Take a screenshot of your graph, save it using your group name and a .jpg extension, then upload it to your group’s page on the class wiki.
2. Let’s say that each shake and pour of M&M’s represents 1 year. About how long will it take for there to be only 9 atoms left?

Based on our findings, between 8 and 9 years

1. Predict what would happen to your lines if you changed 1 or 2 of your data points.

The curve would change

1. Change your 3rd Column B value to 50. Explain what happens to your lines. Take a screenshot of your graph, save it using your group name and a .jpg extension, then upload it to your group’s page on the class wiki.

They shifted

1. Why is it important for scientists to test and re-test their models?

Human error, incorrect calculations, outside influences affecting the outcomes of experiments

1. Suppose 2,560 g of low-level radioactive waste is buried at a waste disposal site. Assume that 10 grams of radioactive material gives off an acceptable level of radiation and that one half-life is 5.26 years. Create an applet representing this situation using Geogebra and find the solution to the problem. Write a paragraph in which you explain to townspeople how much time must pass before there is an acceptable radiation level at the site. Upload the document containing your paragraph and your applet to your group’s page on the class wiki.
2. Save your answers to this worksheet and upload it to your group’s page on the class wiki.